WASHINGTON
SCIENCE TRENDS

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* FAA-INDUSTRY CONFERENCES

"All interested parties" are invited to attend these FAA conferences on flight recorders and distance measuring equipment to be held in March and on research and development, to be held in April.

✓ Airborne Flight Recorders will be discussed March 7-8 at the FAA's Bureau of Research and Development Center, Atlantic City, N. J. Discussion will cover present requirements, current status and developments, the need for "possible regulatory actions" requiring additional parameters to be recorded, and the "need for requiring recorders on all large airplanes of more than 12,500 pounds take-off weight."

FAA says recorders can now be devised to cover many important aspects of aircraft operation including such needed information as flight number and date, power, temperature and pressure indications for each engine; engine speeds; fuel flow; engine vibration; ambient air temperature; altimeter pressure setting; flap and gear position; autopilot operation; radios in operation; cabin altitude, pressure and oxygen operation; brake operation; radios in operation and the frequencies selected; navigation signals received; radio communication and intercom messages; landing gear impact acceleration; and special items for long and short intervals.

✓ Distance Measuring Equipment will be discussed at a meeting in Washington, March 22. Tentative agenda will include a brief review of the background of the development of the DME and associated air traffic control procedures; statements by principal users on their plans for equipping of their aircraft with DME; statements by equipment manufacturers on availability of DME; and an "open discussion" of the feasibility of requiring DME on civil aircraft.

(Conferences called by A. L. Coulter, Chief, Safety Regulation Division, Federal Aviation Agency, Washington 25, D. C.)

✓ Aviation Research and Development will be discussed at the first of a planned annual series of international symposiums to be held April 10-14 at Atlantic City, N. J. Technical papers and panel discussions will pertain to recent research and development accomplishments in the field of air traffic control communications, navigation aids, electronic data processing, airport lighting and marking, and related technical subjects. The fifth day of the conference will be devoted to a tour of FAA R&D facilities. To date, six nations have promised to participate, including Great Britain, Switzerland, Germany, Canada, Uruguay and the United Arab Republic.

(Conference directed by James L. Anast, Director, Bureau of Research and Development, Federal Aviation Agency, Washington 25, D. C.)

* AEC UNIVERSITY PROGRAMS

A. R. Luedecke, General Manager, U. S. Atomic Energy Commission, reports that plans call for support of a "relatively greater increase in basic physical research and in biomedical research in the universities" than in AEC laboratories in the coming decade. "Such research," he declared during the past week, "is doubly valuable when conducted at the universities since it yields as a by-product the training of additional scientists so essential to staff the growing demands of the Nation's research and development institutions."

He also reports:

✓ AEC presently has a total of 1,050 contracts with colleges and universities -- most of it for basic r&d in the physical and life sciences.

✓ Since the beginning of the atomic energy program through June 30, 1960, the Commission has spent approximately $300 million under such contracts with colleges and universities throughout the U. S. For fiscal year 1962 alone, expenditures are likely to reach $80 million.

✓ For the same period, the AEC has invested $38.9 million in construction of capital facilities for basic research at colleges and universities. Projects under construction/or authorized will add another $51.5 million.

✓ Grants to colleges and universities for equipment for nuclear training have totalled 595 since the mid-1950's. Some 254 institutions have benefited from $16.9 million in such awards. In addition, AEC has loaned about $11 million in nuclear materials to many of these same institutions.

* EVALUATING ADP CONTRACTS

Organizations in the market for ADP equipment may benefit from these suggestions by the Navy Management Office on the evaluation of Navy ADP contracts:

✓ Compare terms and conditions as well as price. Especially important are such terms as standard of performance for acceptance; amounts of "use" time allowed for basic rental price; amounts of time given for program testing and debugging -- in what increments when and on what equipment; and conditions and charges for maintenance.

✓ Program Testing clauses in contracts grant varying amounts of testing and debugging time. These should be studied in light of the amounts of time estimated to be required to get the initial applications in shape for successful running, and the differences analyzed in light of man-hour and equipment costs. If time is granted for testing and debugging on the ordered equipment during the first 30-60 days after installation this can be a useful feature where the total productive time is 176 hours or more per month during the initial months of operation, or where the total of testing time plus productive use time will be greater than 176 hours per month during the first few months.

✓ Use time conditions should be carefully studied. Some manufacturers permit use of equipment under certain circumstances during an official meal period and occasional overtime without counting such time as use time for payment purposes. This gives a potential of additional hours of use for the basic monthly charge, and might therefore have an effect on relative post-installation costs.

✓ Maintenance clauses often differ. The kinds of maintenance offered and the conditions under which extra maintenance charges are made should be carefully studied, both for the sake of comparison in making selection, and in estimating post-installation costs.

* RESEARCH AND DEVELOPMENT OPPORTUNITIES

The following opportunities may exist for organizations with demonstrated research and development capabilities and facilities in specialized fields. In each case, the Agency requests complete background information on experience, personnel, facilities, etc;

✓ ASW Training Devices -- These devices would be used for training air crew personnel in antisubmarine warfare. The ability to design and develop prototypes and prepare necessary technical reports or manuals is required.

✓ Recording and Display Devices -- These devices would be used to record and monitor performance of flight personnel in flight simulators.

(Information for the above should be submitted by February 6, 1961 to U. S. Naval Training Device Center, Port Washington, N. Y., ATTN: Code 2552)

✓ Electrochemical Machining -- To establish proven design and process specifications for production type equipment that provides "significantly enhanced capabilities" in utilizing electrical and/or chemical energies (other than the electrical discharge or spark process) for production of high precision missile, aircraft and space vehicle type parts.

(Specifications are highly detailed. Requests for bid sets must be received by Feb. 1. Write Purchasing Office, ATTN: LMEMRP, Wright-Patterson Air Force Base, Ohio or Phone CLearwater 3-7111, Ext. 34226 regarding RFP-RF-33-600-61-5033 Q)

✓ Space Environment Simulation -- A 9 months contract is contemplated for comparative studies of alternate general design features of a large space environments simulation facility intended to test full-sized "weapon system space vehicles." This would include preparation of detailed design criteria for each major component. Contractor must have qualifications in a number of areas including ultrahigh vacuum chambers, cryogenic fluids, data handling equipment, test facility site development, etc;

(Information should be forwarded by Feb. 6, 1961 to Directorate of Procurement, Attn: AEK, Arnold Engineering Development Center, Arnold Air Force Station, Tenn.)

✓ Navy Supply Problems -- This requirement covers firms having demonstrated r&d capabilities in extreme low temperature rubber; vapor permeable, water impermeable clothing materials; atomic, bacteriological and chemical shipboard decontamination; air platforms; expendable pallets and extreme cold weather materials handling equipment.

(Information should be forwarded to U. S. Naval Supply Research and Development Facility, Naval Supply Center, Bayonne, New Jersey)

✓ Demand Prediction -- This requirement covers techniques of predicting supply item demands for all types of material at each echelon and type of activity in the Navy supply system. The system should be applicable for the next ten years, and should be compatible with existing and planned provisioning, procurement and redistribution methods.

(Information should be forwarded to Bureau of Supplies and Accounts (W3), Department of the Navy, Washington 25, D. C.)

RESEARCH CHECKLIST

□ "METAMORPHIC FABRICS" STUDIED FOR RE-ENTRY: Feasibility of parachutes made of organic fiber fabrics which will survive the heat of re-entry by undergoing a chemical change of state is being studied for the Air Force's Wright Air Development Division by Fabric Research Laboratories, Inc. Most parachute designs under consideration for re-entry use today have canopies made of fine metal filaments or ceramic-type or glass filaments all of which have good high temperatures properties but poor textile qualities needed for stowage and deployment. No positive statements have yet been made about fabric organic filaments which will become heat resistant and relatively inflexible as the temperature rises. However, a current report calls for further research with many organic polymers, coated organic filaments and ablative-type organic filaments which char yet retain strength at high temperatures.

(Detailed study of the complete problem of "Metamorphic Fabrics" is contained in WADD Technical Report 60-9, available through military channels or at $2.75 from OTS, U. S. Department of Commerce, Washington 25, D.C.)

□ SPECTROMETER OIL ANALYSIS: The Army is conducting an applied research program to determine the adaptability of a Navy system for early detection of incipient failure of aircraft engines and transmissions. The system is based upon the spectrometric analysis of the wear metals in used engine oil. The Navy has found that important information on internal wear can be derived from the measurement of iron content, as well as aluminum, copper, tin and silver. At the present time, oil analysis can only detect trouble in the oil-wetted portions of the engine.

(Studies being carried out by U. S. Army Transportation Aircraft Test and Support Activity, Fort Rucker, Alabama)

□ SPHERICAL ROCKET MOTOR TESTED AT ALTITUDE: Encouraging results were obtained by the National Aeronautics and Space Administration during the firing of a 20 in. diameter spherical, solid-propellant rocket motor which had a propellant weight equal to 92 per cent of its total weight. The spherical motor and an 11 lb. payload was boosted to an altitude of about 160,000 feet by a three stage rocket. The spherical motor was fired and increased the velocity of the payload by 12,120 feet per second and sent it to an altitude of better than 800 miles. Performance agreed closely with ground tests and theoretical predictions. Specific impulse of the propellant in this motor was only about 185 sec. and its high performance was due primarily to the very large percentage of its total weight which could be devoted to propellant rather than to the nozzle, case and other structure. Large spherical motors are being considered for high-performance space vehicles where their shape will not penalize them aerodynamically. NASA and several rocket engine firms are planning further flight tests of small spherical motors to further confirm theory and ground test work.

(Flight test information on the 20 in. diameter motor is contained in NASA Technical Note D-441, which can be obtained by writing the National Aeronautics and Space Administration, Washington 25, D. C., Attention: Code BID)

□ IMAGE ANALYSIS TECHNIQUE: The National Bureau of Standards has developed a new technique to provide a better understanding of the formation of optical images for photography. The method permits direct electronic scanning of an aerial image of a line object formed by a lens. The resulting measurements, as the width of the lines decreases, show the variations in contrast between light and dark lines. For these measurements, it is reported, information is obtained on the limiting resolution of the lens in various focal planes as well as the effect of lens aberration upon the response at different frequencies.

□ DOPPLER RADAR TESTS: Weather Bureau experiments indicate that the use of Doppler Radar techniques can "greatly improve" the ability to prevent loss of life due to sudden tornadoes. However, much additional evidence is said to be required before firm conclusions can be reached on tornado detection. It is suggested that Doppler radar should also be used for investigating such problems as cloud and clear air turbulence, velocities of falling rain, and detailed velocity patterns in hurricanes. Suggested changes for an "optimum" Doppler radar for meteorological purposes include a 5.4-cm wavelength to reduce attenuation problems, pulsed instead of cw techniques to permit increased power output, and the provision of "sense" to determine directions of motions.

(Studies reported by R. L. Smith and D. W. Holmes, U. S. Weather Bureau, Washington 25, D. C.)

□ AUDIOFREQUENCY CURRENT TRANSFORMER: The National Bureau of Standards is studying the use of current transformers for current and power measurements in the audiofrequency range, in hopes of improving measurement methods. The basic unit of a family of current transformers for operation to 10 kc/s has been constructed and tested. The Bureau reports that the method used for measuring ratio and phase angle of this 5/5 ampere transformer is very sensitive and can easily detect changes in ratio of less than 1 part in a million, and in phase angle of less than 1 microradian throughout the audiofrequency range. The transformer will be used in the stepwise calibration of higher range audiofrequency transformers.

□ ISOTOPE FUEL SOURCE TO HEAT VACUUM TUBES: Feasibility of using a radioistope fuel source to heat the cathode of a vacuum tube has been demonstrated by the Martin Co. under an Air Force contract. A Type X-766 vacuum tube was assembled into an integral unit with 300-curie of Polonium-210 and provided with a manual temperature control system to demonstrate principle. The manual control would be replaced on operational systems by an automatic unit which would keep the cathode temperature constant and compensate for the decreasing heat output of the decaying isotope.

(WADD Technical Report 60-246 available through military channels or for $1.75 from OTS, U. S. Department of Commerce, Washington 25, D. C.)

□ OPTICAL AMPLIFIER RESEARCH: Feasibility of constructing image orthicons which can operate under aircraft type vibrations and pickup transducers which are useful under low light level conditions has been established by Westinghouse Electric Corp. operating under contract to the Aeronautical Research Laboratories, U. S. Air Force Research Division. This work was conducted to meet military requirements including those of the DynaSoar vehicle, which apparently can best be satisfied by a closed circuit television type of light amplifier.

(Details of the work leading to the establishment of the feasibility of this system are contained in ARL Technical Report 60-283, available through military channels, or at $2.25 from OTS, U. S. Department of Commerce, Washington 25, D. C.)

□ MINERAL ANALYSIS TECHNIQUES: Government sponsored studies in cooperation with the University of Alabama indicate that heavy liquid mineral separation techniques can be applied to the evaluation of certain spodumene and kyanite ores, prepared mixtures, and plant products. It is believed that this should be of value in the control of certain plant operations where savings in time, in comparison with usual methods of chemical analysis, will be of considerable advantage.

(Details available. Single Copies Free. Write Publication-Distribution Section, U. S. Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa. for Report of Investigations No. 5657)

PUBLICATION CHECKLIST

- SPACECRAFT DECONTAMINATION, the complete proceedings of a June, 1960 meeting, now available, concerned with the problems and techniques associated with the decontamination and sterilization of spacecraft. Includes a study of component contamination. 56 Pages. Single Copies Free. (Write NASA, 1520 H Street, N. W., ATTN: CODE BID for NASA Technical Note D-771)

- AEROSPACE MEDICINE AND BIOLOGY, a new annotated bibliography prepared by the Library of Congress. This valiant effort to keep up with the space age covers literature in the field for 1954. Available through military channels or at $6 from OTS, U. S. Department of Commerce, Washington 25, D. C. Ask for PB 171 029)

- BONDING INSPECTION, a Federal Aviation Agency quality control manual discussing some of the equipment and techniques now being used in the aircraft industry to locate voids and similar discrepancies in bonded parts. Covers a broad range of subjects in this field from adhesives to ultrasonics to infrared. 48 Pages. 40 Cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for FAA Quality Control Digest No. 5)

- ATMOSPHERIC RADIO NOISE, a useful tool in the analysis of expected interference to radio communication systems operating at frequencies up to about 30 Mc/s. 22 Pages. 20 Cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for NBS Monograph No. 23)

- DRIVING SIMULATORS AND APPLICATION OF ELECTRONICS TO HIGHWAYS, a series of papers exploring the possibility of new devices to pre-test driver reaction to future highway designs. $1.40. (Write Publications Office, Highway Research Board, National Academy of Sciences, 2101 Constitution Avenue, N. W., Washington 25, D. C. for Bulletin No. 261)

- ELECTROREFINING CHROMIUM, a Government study which presents the results of fused-salt electrorefining of chromium in various-type cells. 15 Pages. Single Copies Free. (Write Publications-Distribution Section, U. S. Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa. for Report of Investigation No. 5682)

- ATOMIC FREQUENCY STANDARDS, a discussion of National Bureau of Standards programs in this field, with possible applications in radio communications, satellite tracking, long-range rocket control and astronomical observations. Single Copies Free. (Write National Bureau of Standards, Office of Technical Information, Washington 25, D. C. for Summary Technical Report, Atomic Frequency Standards)

- FUEL CELL SYSTEMS, everyone in the Government's technical services seems to be writing surveys of developments in this fast-moving field. This one, prepared at Griffis Air Force Base, presents operating characteristics of systems developed by Union Carbide, Patterson Moos, Consolidation Coal, General Electric and Mine Safety Appliance Cos. 17 Pages. 50 Cents. (Available through military channels or at 50 cents from OTS, U. S. Department of Commerce, Washington 25, D. C. Ask for RADC-TN-60-118)

- RUSSIAN TRANSLATIONS, a reference aid listing cover-to-cover translations from Russian scientific and technical journals. 16 Pages. Free. (Write Science and Technology Division, U. S. Library of Congress, Washington 25, D. C. for "List of Russian Serials Being Translated into English and Other Western Languages")